

S
388.312
H3t

FEB 14 1975

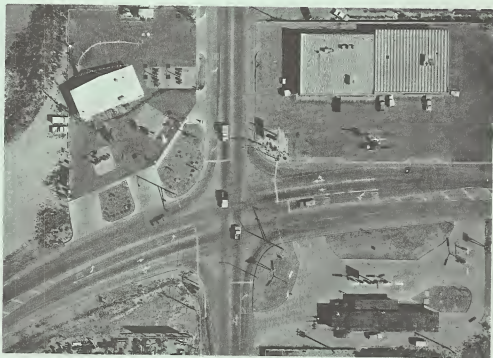
MONTANA'S

STATE DOCUMENTS

TOPICS PROGRAM 1973



MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601



Montana State Library



3 0864 1006 4257 1

TOPICS EVALUATION REPORT

STATE OF MONTANA

Prepared by

MONTANA DEPARTMENT OF HIGHWAYS

PLANNING AND RESEARCH BUREAU

in cooperation with

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

November 1, 1974

REF. 620.4

TOPICS EVALUATION

INTRODUCTION

Pursuant to Par. 9, Sec. 2, Chap. 8, Volume 6 of the Federal-Aid Highway Program Manual, this topics evaluation report is submitted.

Topics planning reports were prepared for all cities in Montana with a population of 5,000 or more. HPR moneys were used to prepare these reports. These planning reports are the principal basis upon which spot improvement on topics type projects are presently being based upon. For many of the smaller cities, the topics report is the only documented planning for transportation that has been done. Urban funds are now being used for projects that were recommended in the topics planning reports since the topics funds have been exhausted.

STATUS OF THE TOPICS PROGRAM BY CITY

Billings

The Billings Topics Plan, recommended projects with an estimated cost of \$1,308,000. By the end 1974, six projects had been constructed at cost of \$260,000 plus engineering costs and four projects are under construction with a total contract cost of \$360,000. Five additional projects are under design and will be placed under contract by the end 1975.

The installation of lighting luminaires along Exposition Drive was completed in 1972 at a construction cost of \$139,000. Another street lighting project for First Avenue No. is expected to be let to contract in 1974 at an estimated cost of \$44,000.

A topics-type project for the installation of a new traffic signal at the intersection of State Street and Orchard Lane was completed in 1974 at a cost of \$19,600.

Great Falls

The Great Falls Topics Plan recommended eleven projects for the First Stage. All these projects have been constructed at a contract price of \$564,667. For the Second Stage, projects estimated to cost \$180,000 were recommended.

Topic-type projects that were constructed or under design that are in addition to those recommended in the Topics Plan include five signalized intersections, of 25th and 26th Streets and an intersection lighting project.

Missoula

The Missoula Topics Plan recommended \$1,839,000 worth of projects to be implemented in three stages.

One hundred and sixty-four thousand dollars (\$164,000) of projects have been constructed and \$233,000 in projects have been or are being designed.

Helena

The Helena Transportation Study recommended 16 Topics-type projects for the Helena Urban area estimated to cost \$525,000. The first four projects have been constructed and evaluation reports have been prepared on two of these projects. (See Appendix) A lighting project along 3.0 miles of Euclid and Lyndale Avenues were completed in 1974 at a cost of \$150,000.

Two additional Topics-type projects have been programed and are scheduled for contract early in 1975.

Butte

The Butte Transportation Study recommended thirteen topics-type projects that were estimated to cost \$261,000. A new traffic signal has been installed on Harrison Avenue in 1974 at a cost of \$26,500. A five block section of this Avenue had been widened to four lanes previously by State Maintenance Forces.

Two of the 13 projects have been programed and will be let to contract in the winter of 1974-1975.

Bozeman

Twelve projects, estimated to cost \$201,000, were recommended in the Bozeman Topics Report. The project to implement the Mendenhall-Babcock one-way couplet has been programed and is scheduled for contract in 1976.

Two topics-type improvements were constructed in 1974 in conjunction with the project to widen West Main Street.

Miles City

Four topics-type projects were selected for possible construction in the Miles City Transportation Study. One project, the installation of new

traffic signals at Eighth and Main Street, has been programed and is scheduled for construction in September of 1975.

Anaconda.

The Anaconda Traffic Study recommended eleven construction projects for the area to be implemented in the next 20 years. Four of these projects are of the topics-type. The widening of an eight block section of Park Avenue from two to four lanes is scheduled for contract in November 1974.

Kalispell

The Topics Study for Kalispell recommended fifteen projects expected to cost \$538,700. One project, the installation of signals at U.S. 2 and Meridian Road, has been contracted at a contract price of \$1,000. Another project, M-6730, has been programed and will be let to contract in the spring of 1975. In 1973, a F-9999 project to upgrade signs and traffic signals on the primary highway through Kalispell was constructed.

Livingston

The Topics Study for Livingston recommended eight projects at an estimated cost of \$117,300. No topics-type projects have been prgramed; however, a F-9999 project has been completed involving signing and installation of traffic signals at two intersections on Park Street in 1974.

Glendive

The Topics Study for Glendive recommended nine projects with an estimated cost of \$82,500. The Barry Street Underpass, the first priority project has been let to contract. Five of the remaining eight projects are expected to cost less than \$1000 each.

Havre

Nine projects, with an estimated cost of \$155,800, were recommended by the Havre Topics Study. Projects for the major construction of First Street (U.S. 2) and Fifth Avenue are scheduled for contract letting within the next few years which will take all available highway funds for Havre until after 1978.

Lewistown

New traffic signals have been installed on Main Street in 1974, and several old traffic signals were removed as part of a F-9999 project. In addition, other traffic control devices were upgraded on the primary highway in Lewistown. Nine projects, expected to cost \$43,300 were recommended by the Topics Study. None of these projects have been programmed.

SUMMARY

Table No. 1 summarizes the total estimated costs of projects recommended in the thirteen Topics Studies conducted for each of the urban areas in Montana. Of the \$5,885,100 in projects recommended, \$1,657,200 in projects have been built or are under contract.

Table No. 1

COST SUMMARY

RECOMMENDED TOPICS PLANS
AND PROJECTS COMPLETED OR UNDER
CONSTRUCTION

	<u>1970 Population</u>	<u>Recommended Projects Estimated Cost</u>	<u>Cost of Projects Completed or under Construction</u>
Billings	74,800	\$1,308,000	\$ 620,000
Great Falls	74,200	744,700	564,700
Missoula	50,700	1,839,000	233,000
Butte	40,500	261,000	26,500
Helena	26,800	525,000	97,000
Bozeman	18,700	201,000	18,000
Kalispell	22,300	538,700	31,000
Havre	10,500	155,800	-----
Anaconda	9,800	28,800	-----
Lewistown	6,500	43,300	-----
Livingston	6,900	117,300	-----
Glendive	6,300	82,500	67,000
Miles City	9,000	<u>40,000</u>	<u>-----</u>
Total		5,885,100	1,657,200

EVALUATION OF SELECTIVE TOPICS PROJECTS

In evaluating the effectiveness of the Topics program the individual projects were reviewed. It was possible to review some of the earlier projects on a quantitative basis by comparing the reduction in accidents and/or the increase in capacity.

The traffic engineers assigned to the divisions made subjective comments on completed topics projects in their area. Most topics projects have not been completed long enough to provide a long enough after period to evaluate safety.

A selective number of completed topics projects will be discussed as far as the benefits to the auto drivers and/or pedestrians are concerned.

Billings

Poly Drive and Virginia Lane, project T-9010 (5), this project consisted of replacing an existing traffic signal with a new fully actuated signal and installing new signs and pavement markings. This intersection had an average of 10 1/2 accidents per year with a high percentage of being angle collisions resulting in many injuries. In the first full year after the improvement was completed no accidents were experienced.

4th and 6th Avenue North couplet, T-9010 (7) and (8). New traffic signals were installed at nine intersections on these two Avenues. These signals were interconnected for progression and new signs and pavement markings were installed.

Overall travel speed has increased but safety has been improved. For 6th Avenue North an average of 67 accidents occurred per year of which 11 were injury accidents. These accidents occurred at the five signalized intersections along 6th Avenue. In the first year after improvement 13

accidents occurred of which 3 resulted in injury.

For the four signalized intersections of 4th Avenue North an average of 28 accidents occurred of which 6 were injury accidents. In the after period 17 accidents occurred of which 6 were injury accidents. This is a reduction of more than 300 percent.

The sharp reduction in accidents and the faster travel speeds are no doubt the result of one-way operation of 4th and 6th Avenues. Topics projects now under construction will extend the one-way operation throughout the Central Business District.

Great Falls

Smelter Avenue and 4th Street, N.E., T-9052 (11). The jog in 4th Street was removed by off setting the two sections of 4th Street north and south into a curving street section that connect to Smelter Avenue at one location. Channelization islands and two street luminaires were installed. New signing and pavement markings were placed throughout. The operation of this intersection was greatly improved and vehicle accidents were reduced from four per year before the improvement to a single accident for the first year after.

Fourth Street and Railroad couplet, T-9052 (5). This one-way couplet was installed between Central Avenue W. and Fifth Avenue, S.W. This improvement provides relief for the 6th Street S.W. arterial north of the Burlington Northern underpass and provides an alternate route for traffic between Central Avenue W. and 10th Avenue S. Existing traffic signals were removed from the intersection of 5th Street S.W. and Central Avenue W. The intersection of 3rd Street N.W. and Central Avenue W. was improved by widening 3rd Street on the north side and restricting traffic to one-way

on the south approach. Parking was restricted on both sides of Central Avenue W. in order that a left turn lane could be provided on both approaches to 3rd Street N.W. Although traffic volumes entering the intersection of Central Avenue W. and 3rd Street increased, the accidents decreased from 21 per year before the improvement to 4 accidents the first year after.

South River Road from Tenth Street to Giant Springs Road, T-9052 (4). This project improved the intersections of River Road with 10th Street and with 25th Street. Pavement markings and channelization were installed at both intersections. Highway lighting was installed at these intersections as well as along the River Road from 10th Street to Giant Springs Road. New guard rail was installed at those locations warranting its installation.

The South River Road has experienced a growth in traffic; however, the total accidents along this section of road has decreased from a yearly average of 32 to a total of 8 for the first year after the completion of the project. This is a reduction of 400 percent.

Helena

An evaluation report of two projects of the four completed in Helena is included in the appendix.

Table No. 2

TABULATION OF TOPICS PROJECTS
COMPLETED OR UNDER DESIGN

Billings

1. T-9010 (3)	Poly Dr. & Virginia Lane New Tr. Signal & Channelize	44,139.63
2. T-9010 (7)	4th & 6th Ave. No. Couplet New Tr. Signals & Control Devices	163,821.93
3. T-9010 (8)	Grand, Division & 32nd New Tr. Signal & Channelize	44,097.58
4. T-9010 (20)	Broadwater & 16th W. New Tr. Signal	17,633.70
5. T-9010 (22)	Lewis Ave. & 8th St. W. Remove Jog	45,478.00
6. T-9010 (19)	Division to 32nd - 6th & 1st Ave. Implement one-way Streets	23,221.80
7. T-9010 (13) M-5112(2) M-7111(1)	Montana Ave. - 1st Ave. No. Couplet Implement one-way couplet	274,081.00
8. T-9010 (2)	I-90 Bus Route & Moore Lane Traffic Signal & RR Signal	13,000.00
9. T-9010 (10)	27th St., 1st Ave. No. to 1st Ave. S. Widen & new RR Signal	<u>15,000.00</u>
	Subtotal	640,473.64

Great Falls

1. T-9052 (3)	Central Ave. W. & 9th St. Smelter Ave. & Division Rd. Intersection improve.	21,578.60
2. T-9052 (4)	River Drive - 10th St. to Giant Springs Rd. Light, Guardrail Channelize	221,909.00

Table No. 2 Cont.
 TABULATION OF TOPICS PROJECT
 COMPLETED OR UNDER DESIGN

Great Falls

3. T-9052 (5)	Fourth and Railroad Couplet, Central Ave. W. to 5th Ave. S.	33,583.00
4. T-9052 (7)	Central Ave. W. & 6th St. Intersection Improvement	45,978.00
5. T-9052 (8)	Tenth Ave. So. and 9th St. Intersection Improvement	44,600.00
6. T-9052 (11)	Smelter Ave. and 4th St. N.E. Intersection Improvement	82,303.00
7. T-9052 (14)	Tenth Ave. So. & 2nd St. So. Intersection Improvement	32,473.00
8. T-9052	Park Drive & 1st Ave. No. Widen and New Tr. Signals	210,175.00
9. M-7209 (1)	25th & 26th St. at 1st & 2nd Ave. No. and Central	<u>142,635.00</u>
	Subtotal	852,734.00

Missoula

1. T-9081 (1)	So. Orange, 3rd to 6th St. Widen, New traffic Signals	62,180.00
2. T-9081 (2) & (3)	Broadway - Balnche to Toole RR Signals & Widen	57,828.00
3. T-9081 (4)	Arthur & Sixth New Traffic Signal	21,057.00
4. T-9081 (5)	Arthur & Beckwith New Traffic Signal	1,180.00 24,110.00
5. T-9081 (6)	Arthur & University Remove Tr. Signal	228.00

Table No. 2 Cont.
 TABULATION OF TOPICS PROJECTS
 COMPLETED OR UNDER DESIGN

Missoula

6. T-9081 (8)	Russell - 4th St. to 7th St., Widen & New Tr. Signal	90,081.00
7. T-9081 (11)	Orange, Front & Main New Traffic Signal	<u>56,925.00</u>
	Subtotal	313,649.00

Helena

1. T-9058 (1)	Cedar & Montana Main & Lyndale Eleventh & Rodney Benton & Neill Intersection Improvement	126,773.00
2. T-9058 (2)	2 - School Flashers	7,673.00
3. T-9058 (3)	Montana Ave. with Helena and Benton - New Signals	3,000.00
4. T-9058 (4)	Montana Ave. with Prospect and 11th Ave., extend couplet	<u>2,000.00</u>
	Subtotal	139,446.00

Kalispell

1. T-9067 (1)	Idaho & Meridian Rd. New Traffic signals	38,469.00
---------------	---	-----------

Grand Total	1,984,771.64
-------------	--------------

A P P E N D I X

INTER-DEPARTMENTAL MEMORANDUM
DEPARTMENT OF HIGHWAYS

To P. E. Poirier, Planning and Research

Subject: Topics Evaluation

From C. W. Klimper, P.E., Supr. - Div. Const. Sec.

Date October 4, 1974

As requested, previously constructed Topics projects in the City of Billings were observed at peak traffic demand periods. The following narrative is a subjective evaluation of the Topics Projects based on these observations.

T-9010(5) Poly and Virginia

The geometric design of this intersection sufficiently segregates turning movements and provides minimum conflicts to through movements. Although some revisions may be needed to avoid delay at off peak hours, peak hour traffic is below capacity, providing a high level of service.

One particular operational problem has arisen. Since North-South Intersection length is excessive, two signal indications are provided for both through directions. This arrangement was designed to clear traffic trapped within the intersection. Programmable heads are used so that the rear signal does not draw traffic into the intersection when the forward signal is red. The design is fulfilled in daylight, but a night glow problem is apparent in the dark. There have been several instances where stopped traffic has been drawn into the intersection by a green glow from the rear signal. Alternate solutions to this problem are now being considered.

Overall, it is a safe, high capacity intersection that operates primarily as it was designed.

T-9010(7) & (8)
4th and 6th Ave. Couplet
Division & 32nd

The couplet system provides excellent circulation through the Central Business District. Traffic suffers very little delay. Signal progression allows an average overall travel speed in excess of 20 mph.

Turning movements on some intersecting streets seem to provide conflicts at various times. This is probably due to lower levels of service provided on the intersecting streets. When the one way grid system is implemented those conflicts should be reduced.

INTER-DEPARTMENTAL MEMORANDUM

STATE HIGHWAY COMMISSION OF MONTANA

To Paul Devine - P.E. - Chief - Planning & Research
BureauDate October 28, 1974From James T. Sullivan - P.E. - Supvr. - Div. Const.
SectionSubject: Annual Topics
Evaluation - Gt. Falls

As requested by Mr. Paul Poirier of the Planning & Research Bureau, the following is a report covering completed Topics projects in the Great Falls area:

- (1) F 278(9) - Lighting at 3rd Street Northwest and Division Road completed in December, 1971 for \$3,800.00. Prior to this project, the Department was continually plagued with complaints from drivers being unable to find the proper left-turn bay to turn from 3rd Street Northwest onto Division Road. Division Road is a heavily traveled two-lane, linking the residential Riverview area to 3rd Street Northwest, an arterial four-lane carrying an A.D.T. of 16,000. The project has improved the efficiency and safety of this intersection by providing adequate visibility during night time hours.
- (2) F 388(17) - Installation of traffic signals at the intersections of 10th Avenue South with Fox Farm Road and 6th Street Southwest completed in July, 1969 for \$19,900.00. The signal installation at Fox Farm Road has benefited the community because of the rapid expansion of housing to the south of 10th Avenue South in recent years. This has established Fox Farm Road as a major link with 10th Avenue South and the rest of Great Falls. The signal installation at 6th Street Southwest has reduced delay at the intersection. The signals at these two intersections are inter-connected to provide minimum delay for traffic on 10th Avenue South.
- (3) T 9052(11) - Channelize and light Smelter Avenue and 4th Street Northeast completed July, 1972 for \$57,000.00. The channelization of this intersection has improved the efficiency and safety by the use of right and left-turn lanes. Delay time has been greatly reduced. The thermoplastic pavement markings are still completely visible and help to organize the traffic movements. Lighting has helped reduce conflicts at night.
- (4) T 9052(6) - Park Drive completed December, 1973 for \$154,200.00. The widening of two blocks on Park Drive has improved capacity by providing more pavement space for adequate turn-bays. Backups, which were common during the evening rush hour prior to the project, have almost been eliminated. The installation of two double left-turn bays from Park Drive onto First Avenue North and Central Avenue helps handle the large turning movements at this intersection. Overall travel time for vehicles entering and leaving the Central Business District by Park Drive has been reduced.

Paul Devine - Chief - Planning & Research Bureau
October 28, 1974
Page Two

- (5) T 9052(7) & (8) completed in March, 1974 for \$82,300.00

Under (7) - The approaches were widened and new signals were installed at Central Avenue West and 6th Street. Delay time was reduced and capacity increased, with a leading green phase for left-turns from Central Avenue West onto 6th Street.

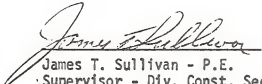
Under (8) - The south approach at 10th Avenue South and 9th Street was widened and new signals were installed. This is one of the highest volume intersections in Great Falls and the widening of the south approach on 9th Street South to establish turn-bays has helped reduce delay time for traffic coming from Holiday Village Shopping Center.

- (6) T 9052(3), (4) & (5) completed June, 1973 for \$206,400.00.

Under (3) - The intersection of Smelter Avenue & Division Road was lighted and turn-bays were established with pavement markings. This has improved the efficiency by getting all left-turning vehicles into left-turn bays and away from thru traffic.

Under (4) - Guard rail, channelization and lighting were installed on River Road between 9th and 25th Streets. The guard rail has added to the safety of River Road and the lighting has improved visibility at night. The intersections of 9th Street and 25th Street at River Road were channelized with concrete islands and pavement markings. The delay time has been decreased with the addition of these turn-bays and the safety increased because of the organization of the traffic movements.

Under (5) - A one-way couplet on 4th Street Southwest and Railroad Street was established between Central Avenue West and 5th Avenue Southwest. This couplet has provided an alternate for vehicles using 6th Street Southwest as a link between 10th Avenue South and Central Avenue West and consequently has relieved some congestion on 6th Street Southwest. Also, new signals were installed at Central Avenue West and 3rd Street Northwest, which has contributed to the increased capacity at this intersection.


James T. Sullivan - P.E.
Supervisor - Div. Const. Section

JTS/RHJ/r
cc: A. Zbitnoff
R. Jacobson
File

INTER-DEPARTMENTAL MEMORANDUM
DEPARTMENT OF HIGHWAYS

To PAUL E. POIRIER, SUPVR.-URBAN PLANNING SECTION

DATE: OCTOBER 16, 1974

~~EXHIBIT~~

From BEN C. MILLER, SUPVR.-DIV. CONST. SECTION

SUBJECT: EVALUATION OF
~~DATA~~ TOPICS PROGRAM

A detailed analysis of completed TOPICS programs is not possible at this time. However a general evaluation of conditions resulting from completed TOPICS projects would be that immense improvements have been made to increase capacity and safety.

I believe that the City Engineers office would have more information and be able to give us a detailed evaluation using such indicators as accidents, accident rates, person moving capacity, travel speed, travel time, delays, etc., especially on the Arthur & 6th, Arthur & University, and Arthur & Beckwith projects. We are forwarding a copy of this memorandum to the City Engineer in hopes that he will send his comments and evaluations also.

The Orange, Main & Front Street, and the Russell Street at 5th & 6th Streets projects have not been completed long enough for an evaluation at this time.

One problem which did arise with the TOPICS projects was that planning and design were insufficient at the transitions to existing conditions.

We feel that the TOPICS concept is very good and that more projects of this nature should be programmed.

BCM:TEM:lb

cc: Tom Crowley, City Engineer
Division File


Ben C. Miller

Avoid Verbal Instructions

H E L E N A
URBAN TRANSPORTATION STUDY
TOPICS EVALUATION REPORT
T - 9058(1)

Prepared by
MONTANA DEPARTMENT OF HIGHWAYS
PLANNING AND RESEARCH BUREAU
in cooperation with
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

May, 1974

REF. HLN. 620.4

EVALUATION OF A HELENA TOPICS PROJECT

Two intersection improvements were selected for evaluation. These intersections, Montana Avenue and Cedar Street, and Lyndale and Main Street were part of a four intersection Topics Project. The project, T-9058(1), was let to contract in July, 1971 and completed by September, 1972 at a project cost of over \$100,000.

Montana Avenue and Cedar Street

This intersection is located in the northern portion of the city. This area is growing quite rapidly. Figure No. 1 graphically portrays the development around this intersection. The before picture was taken in 1969 and at that time Montana Avenue was controlled by stop signs, although that street carried more than half of the approach traffic. Back up of both north and south approaches of Montana Street for up to two blocks occurred several times a day. Volume of traffic entering the intersection in 1969 averaged 11,500 vehicles.

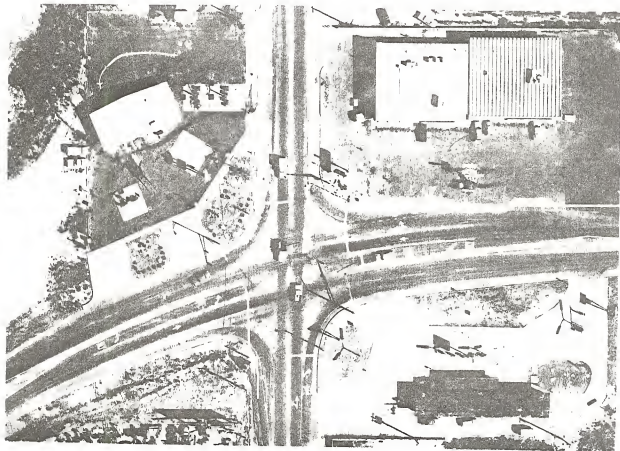
For the five years before the construction of the project, 24 accidents occurred. These accidents were fairly divided between the different types such as rear-end, angle and turning movement. The overall accident rate was 1.1 accidents per million entering vehicles.

The construction at this intersection included a new three-phase, full-actuated traffic signal. The approaches on Montana Avenue were widened to provide two lane approaches for both directions. Left-turn lanes were marked on Cedar Street.

Following completion of the project congestion was significantly reduced. Because of the full-actuated feature of the installation, Montana Avenue received the majority of the green time. Operation of the signal proved to be snappy and quick to adjust to changing traffic loads. Back ups were short in length and duration for all approaches. Traffic volume entering



CEDAR STREET AND MONTANA AVENUE - 1969



CEDAR STREET AND MONTANA AVENUE - 1973

the intersection in 1973 averaged 17,600 vehicles, a 53% increase over the before period.

For the twenty-one months following the completion of the project, the intersection experienced 17 accidents for an accident rate of 1.5 accidents per million entering vehicles. Rear end type accidents accounted for 53% of the total versus 33% of total for the before period. This situation is fairly common following installation of a traffic signal at an intersection controlled by stop signs.

Lyndale and Main Street

Lyndale and Main Street are both principal arterials. The west leg of Lyndale was reported to be deficient for capacity in the Helena Transportation Study. The total 1969 traffic entering the intersection was 18,800 vehicles per day.

For the four years, 1967 thru 1970, a total of 55 accidents occurred at this intersection. In 1967 a total of 9 angle type and 11 turning movement type accidents were reported. A leading left turn phase with a green arrow indication was installed in the latter part of that year. The next year, 1968, the turning movement accidents reported were four in number compared to 11 in 1967. The total number of accidents reported in 1968 was 12 compared to 28 in the previous year.

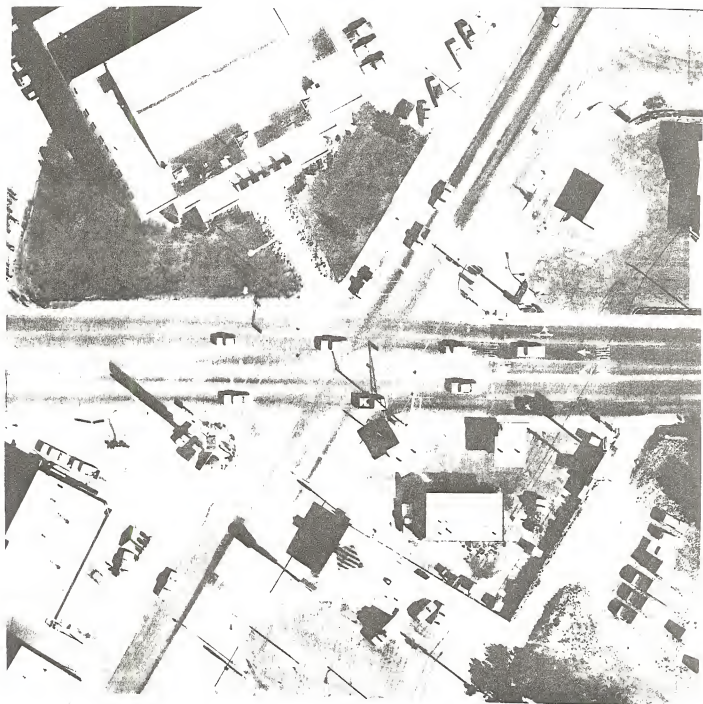
Congestion was frequently experienced principally because of the heavy left turn volumes from all approaches. Parking was restricted along the curb lines of Lyndale east from Main Street. The added width was marked out into four lanes and a left turn lane. This expedient plus the leading left turn phase helped ease the left turn problem for the east approach.

The TOPICS work at this intersection included removal of a four foot wide raised median on the west approach of Lyndale in order to provide room

for a left turn lane. Painted left turn lanes were marked out for all approaches. A new four phase, full actuated controller and left turn arrows on longer mast arms were installed. A larger radius curb return was installed at the southeast corner to allow a right turn to be made from the curb lane. Figure No. 2 shows an aerial view of intersection.

The operation of the intersection was improved by marking out exclusive left and right turn lanes. The left turn lanes on Lyndale were provided with detectors which will place a call for the leading left turn phase when needed.

Volume of vehicles entering the intersection increased to 23,200 by 1973, which is an increase of 23% over the before period. The accident rate for the 21 months after completion was 0.54 accidents per million vehicles entering compared to 2.0 accidents per million vehicles entering. There were no left-turn accidents in the after period.



INTERSECTION OF LYNDAL AVENUE AND MAIN STREET

Figure No. 2

TOPICS PROGRAM
EVALUATION PROCEDURES FOR
EFFECTIVENESS OF IMPROVEMENTS

Location Helena

Analysis Area (Intersection/Section & Length) Cedar Street and Montana Avenue

Length _____

Type of Improvement Traffic Signal and Widen Montana Avenue

Effective Date of Improvement July, 1972

Traffic

19 69 11,500 ADT/Peak Hour

19 73 17,600 ADT/Peak Hour

Change + 4,400 = 23 %

Capacity

Montana - North Approach 1970 Stop Intersection VPH L.S. = _____

19 73 600 VPH L.S. = C

Accidents

1970 2/1.43Ac/MV Rate/Number

19 73 8/1.25Ac/MV Rate/Number

Change +3 = -13 %

Annual Savings thru Change \$ _____

Travel Speed

1970 _____ MPH

19 _____ MPH

Change _____ = _____ %

Annual Savings thru Change \$ _____

AVERAGE ANNUAL MOTORIST SAVINGS

SINCE IMPLEMENTATION OF IMPROVEMENT \$ _____

REMARKS: Major improvement was the reduction of congestion and delay for Montana Avenue.

TOPICS PROGRAM
EVALUATION PROCEDURES FOR
EFFECTIVENESS OF IMPROVEMENTS

Location Helena

Analysis Area (Intersection/Section & Length) Lyndale and Montana Avenue

Length _____

Type of Improvement Channelization and Signal Improvement

Effective Date of Improvement July, 1972

Traffic

1969 18,800 ADT/Peak Hour

19 73 23,200 ADT/Peak Hour

Change +4,400 = 23 %

Capacity

Lyndale Avenue 1970 525 VPH L.S. = E

West Approach 19 660 VPH L.S. = C

Accidents

1970 5/0.13Ac/MV Rate/Number

1973 4/0.41Ac/MV Rate/Number

Change -1 = 36 %

Annual Savings thru Change \$ _____

Travel Speed

1970 _____ MPH

19 _____ MPH

Change _____ = _____ %

Annual Savings thru Change \$ _____

AVERAGE ANNUAL MOTORIST SAVINGS

SINCE IMPLEMENTATION OF IMPROVEMENT \$ _____

REMARKS: Major improvement was reduction in delay by providing separate left turn lane for all four approaches.

